# THE EVOLUTION OF NEUROLOGY*

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Progress in neurology lagged behind other branches of medicine because of the slowness of the development of knowledge regarding the form and function of the nervous system. The brain and spinal cord, covered with a hard, bony shell, are particularly inaccessible to direct examination. The type and nature of disease of these structures could only be inferred from a study of the disorders of function which occurred when they were damaged, until more accurate methods of visualization of details of their intimate structures were discovered. When the techniques of auscultation and percussion were introduced into medicine, these methods were applied to the study of the nervous system.They were rapidly discarded as useless. It is interesting to quote from an article written by James Hope in 1840: "The diseases of the brain are, at the present moment, more obscure than any great class in the nosology. Twenty years ago, the same was said, and with truth, of the diseases of the lungs and heart; but the elucidation and corroboration of the general symptoms by the physical signs derived from auscultation, percussion, etc., have reversed the proposition and not only redeemed these diseases from their obscurity, but actually rendered their diagnosis more precise and certain than that of any other important class. There are no physical signs applicable to the brain; and, from the circumstances in which the organ is placed, it is to be feared that none will ever be discovered."

This pessimism can be understood when one realizes that at this time, the tendon reflexes, plantar responses, and the now well-known signs of dysfunction of the cerebellum, or basal ganglia, had not yet been described.

An adequate examination of the nervous system was not possible

* Presented, March 10, 1959, at the combined meeting of the Section on Neurology and Psychiatry of The New York Academy of Medicine with the New York Neurological Society, commemorating the 50th Anniversary of the Neurological Institute of New York of the Columbia-Presbyterian Medical Center.

until the form of the central nervous system had been accurately described and the function of various parts elucidated by surgical ablations, electrical stimulation, and the pathologic study of experiments of nature.

Some knowledge of the function of the brain and spinal cord was known to the ancient physician, but the concept of humors and vital spirits prevailed in the writings of Hippocrates and Galen. Convulsive seizures and headache were the two neurological symptoms which received most attention in the writings of ancient physicians. With the Renaissance, neurology began to advance through the foundation of a scientific anatomy in the 16th century by Leonardo da Vinci and Vesalius. Further advances were made in the 17th century by Willis, Vieussens, van Leeuwenhock, Pacchioni, and others. These men paved the way for the studies in the 18th century which culminated in such fine atlases of the nervous system as that of Soemmerring.

The development of the concepts of the physiology of the central nervous system paralleled to a great extent the growth of knowledge of anatomy. Signal advances were not made, however, until the 19th century. The studies of men such as: Sir Charles Bell, Johannes Muller, E. H. Weber, A. V. Waller, Du Bois-Reymond, Gustav Fritsch, Eduard Hitzig, J. C. Dalton, David Ferrier, John Hughlings Jackson, and others, culminated in the modern neurophysiology typified by the writings of Sir Charles S. Sherrington.

On the background of these advances in anatomy and physiology, neurology began to emerge as a clinical specialty in the middle and latter parts of the 19th century. Guillaume B. A. Duchenne is generally credited with being the founder of modern clinical neurology. He was followed, in France, by J. M. Charcot, Pierre Marie, Josef F. F. Babinski and J. J. Dejerine; in Germany, by M. H. Romberg, W. H. Erb, C. F. O. Westphal, and H. Oppenheim; in England, by John Hughlings Jackson, D. Ferrier, William R. Gowers, H. C. Bastian, Henry Head, and S. A. Kinnier Wilson.

American neurology was cradled in the army and had its start in the period of the Civil War. W. A. Hammond, Surgeon General, during 1862-63, created a special military hospital for nervous diseases, in Philadelphia in 1862. He is credited with writing the first treatise on nervous disease in the English language, in 1871. An independent chair in neurology was established at the University of Pennsylvania in 1876,

with H. C. Wood as Professor of Diseases of the Nervous System. In Boston, James J. Putnam was made Lecturer on Neurology in 1872, but neurology was not separated from medicine at Harvard until 1895. In New York, Edouard Seguin was appointed Professor of Diseases of the Nervous System at the College of Physicians and Surgeons in 1871. Other early leaders of neurology in this country include: C. K. Mills, S. Weir Mitchell and W. G. Spiller, in Philadelphia; and Moses Allan Starr, Charles L. Dana, E. C. Spitka, and Bernard Sachs, in New York.

Although the pathology of the central nervous system was studied in the 17th and 18th centuries, neuropathology did not come of age until the first part of the present century. The names of a few who have contributed to the development of neuropathology include: Alois Alzheimer, Max Bielschowsky, Constantin von Economo, Alfons Jacob, Franz Nissl, Walter Spielmeyer, and Carl Weigert, of Germany; Raymon Y. Cajal and Pio del Rio Hortega, of Spain; Ettore Marchiafava and Giovanni Mingazzini, of Italy; Jean Cruveilhier, of France; Georges Marinesco, of Rumania; J. Godwin Greenfield, of England; and J. H. Globus and W. B. Hassin, of the United States.

On the firm background of anatomy, physiology and pathology, neurology has advanced in the United States from its modest beginnings in three medical schools. At the present time there are independent departments, or specialized sub-departments of neurology, in more than one-half of the schools of this country. The American Neurological Association has grown from a membership of 35 in 1875 to 400 in 1958; and the recently founded American Academy of Neurology has a membership of more than 2,000. In addition, there are special societies for neuropathology, neurophysiology, electroencephalography, and neurochemistry.

Modern clinical neurology is tending to veer away from the minutiae of the neurological examination in favor of a broader study of the patient. The precise localization of the lesion has given way to an analysis of the disturbance of function in terms of the underlying physiological, biochemical and metabolic disturbance. Accuracy of localization by a careful neurological examination is not to be decried, but lesions in the nervous system, particularly in the case of tumor where localization is so important, can now be sharply delimited by electroencephalography, pneumoencephalography, angiography, and myelography. The surgeons, who operate on patients, desire information with

regard to exact extent, blood supply and the like, which can be obtained from these special tests. They are rarely willing to operate on patients without this valuable additional information. The clinicians who deal with other organic and functional diseases of the nervous system now turn to the physiologist and biochemist for aid in the solution of their problems.

Anatomy, physiology and pathology have laid the groundwork. Biochemistry is the field which now offers great promise for the future. This does not imply that the older basic science disciplines should not be nurtured. All have a great deal to contribute to the advancement of our knowledge of the nervous system and it is quite possible that any one of them may ultimately contribute equally as much, or more, to the solution of clinical problems than the more recently developed sciences of biochemistry and biophysics.